

Automated Sample Digestion

DEENA

Operator's Manual Part 2
Spare Parts & Maintenance

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Automation for Analytical Laboratories



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Rev 0.1	April 3, 2007	Draft release
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Rev 1.0.1	Nov. 2, 2007	Updated version, new features
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Rev 1.2.0	April 5, 2010	Updated Troubleshooting
Rev 1.2.0	August 10, 2010	Updated version, new features

Table of Revisions

Instrument Serial Number: _____

VialDef Position X: _____ (630)

Y: _____ (220)

Software Serial Number: _____

USB COM PORT: _____

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1) Spare Parts

DEENA Spares

Please refer to figures 1-1 and 1-2 for help in identifying DEENA parts.

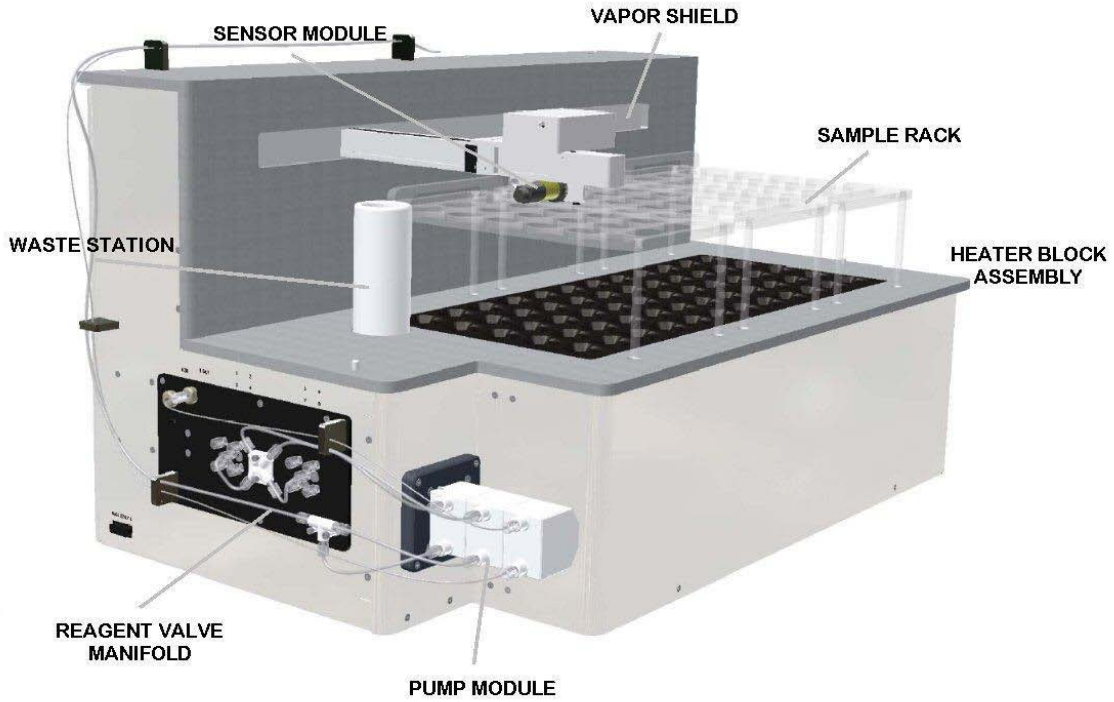
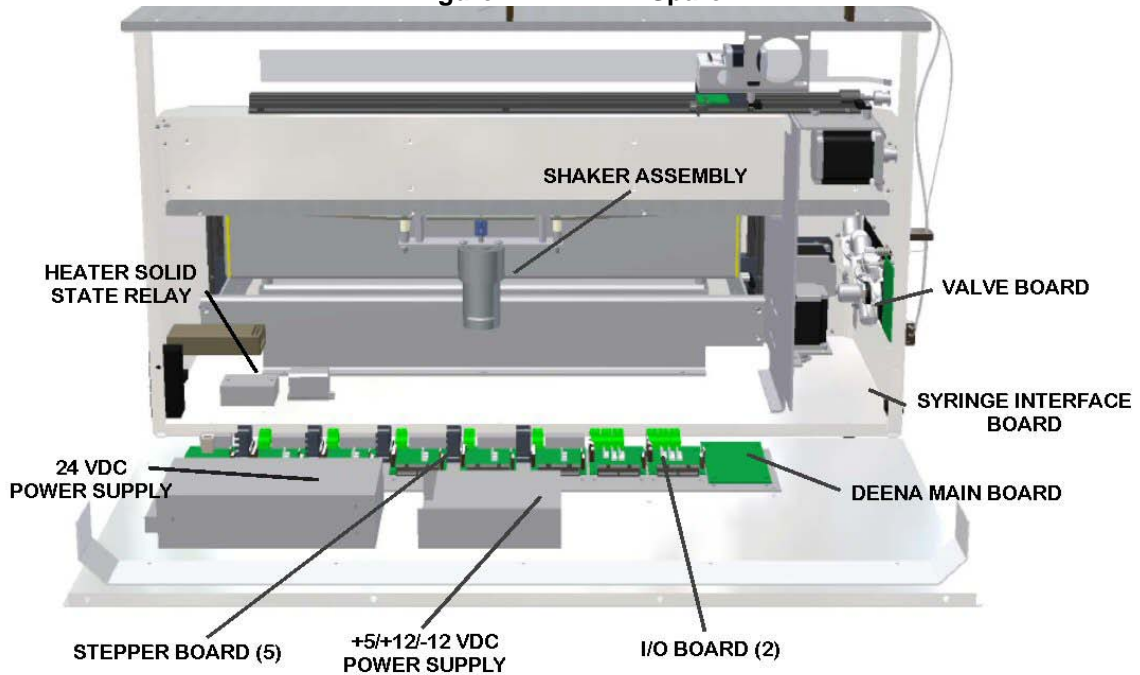


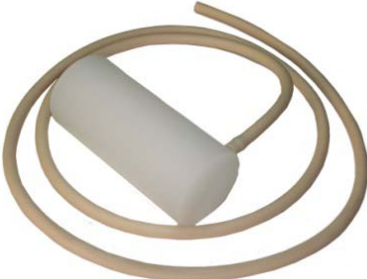





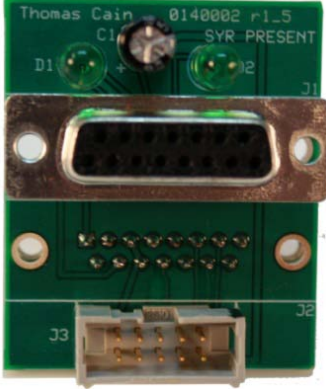
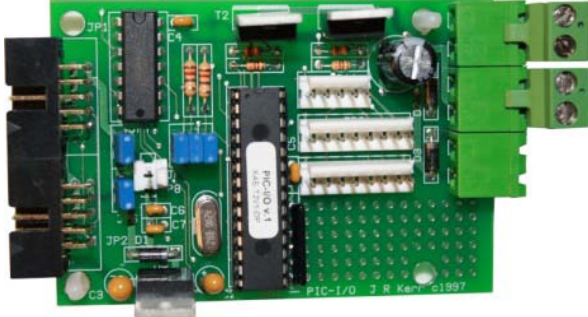
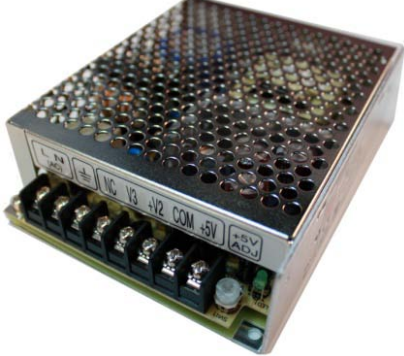
Figure 1-1 DEENA Spare


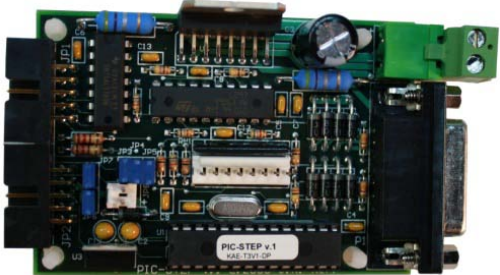










/ReplacementsReplacement Parts I




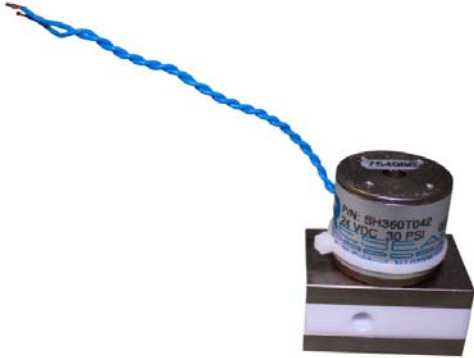
Figure 1-2 DEENA Spare/Replacement Parts II




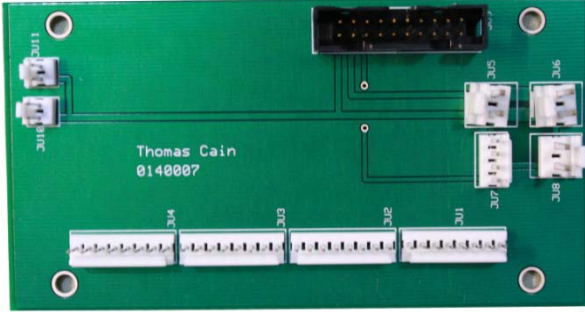
	<i>Part Number</i>	<i>Part Name</i>
	8000001	Vapor Shield
	8000002	Sample Rack
	8000005	Waste Station
Not Shown	8000006	Reagent Valve Manifold
Not Shown	8000007	Pump Module
	8000008	DEENA Shaker Assembly
	8000009	Heater Solid State Relay

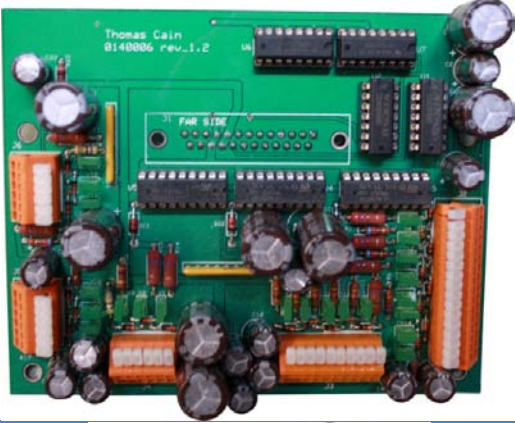




 <p>A green printed circuit board (PCB) with various electronic components. At the top, there are two silver D-sub connectors. Below them are several integrated circuits, including a PIC16C54B. The board features several green LEDs and a row of pins at the bottom.</p>	<p>8000010</p>	<p>Reagent Valve Board</p>
 <p>A green PCB with a large metal D-sub connector in the center. The board has several green LEDs and a row of pins at the bottom. Text on the board includes "Thomas Cain 0140002 r1.5" and "SYR PRESENT".</p>	<p>8000011</p>	<p>Syringe Interface Board</p>
<p>Not Shown</p>	<p>8000012</p>	<p>DEENA Main Board</p>
 <p>A green PCB with a PIC16C54B microcontroller. It features a large black connector on the left, a PIC16C54B chip, and several green terminal blocks on the right. Text on the board includes "PIC-1/O 2 R Kent c1597".</p>	<p>8000013</p>	<p>I/O Board</p>
 <p>A metal power supply unit with a perforated top. The front panel has several terminals labeled "GND", "NC", "V3", "V2", "COM", "+5V", and "+5V ADJ".</p>	<p>8000014</p>	<p>+5/+12/-12 VDC Power Supply</p>



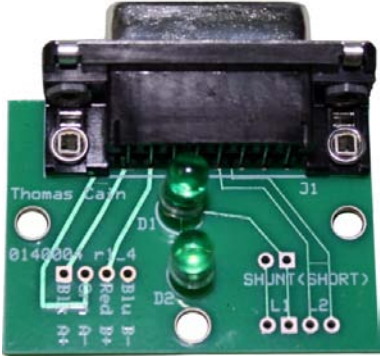

	8000015	+24 VDC Power Supply
	8000016	Stepper Board
	8000017	Peristaltic Pump Replacement Tubing Kit (tubing and fittings)
<p style="text-align: center;">Not Shown</p>	8000018	Reagent Valve Tubing Kit
<p style="text-align: center;">Not Shown</p>	8000019	Arm Tubing Kit - DEENA
	8000020	Serial Communications Cable
	8000021	Power Cord

	8000022	Fuse Kit
<p style="text-align: center;">Not Shown</p>	8000023	Reagent Uptake Tubing Kit
	8000024	USB-Serial Converter
	8000031	Standards Valve Tubing Kit
	8000032	Syringe Arm Tubing Kit
	8000035	Fume Hood Hinge

	<p>8000040</p>	<p>DEENA Temperature Probe Assembly</p>
	<p>8000041</p>	<p>Vial Transfer Rack, 16mm x 50 Position</p>
	<p>8000042</p>	<p>Replacement Rubber Kit</p>
	<p>8000048</p>	<p>Dual Loop 3-way Valve Replacement Kit</p>

 <p>A cylindrical white plastic container with a black cap and a blue braided cable. The container has a blue logo and text that includes "24 Volts" and "Fairfield Ave. W. California".</p>	<p>8000049</p>	<p>2-way Air Valve Replacement Kit</p>
 <p>A green printed circuit board (PCB) with various electronic components. It features two large silver connectors, several integrated circuits, and a row of five green LEDs at the bottom. Text on the board includes "74HC154N", "L808M4", and "UHG0840B".</p>	<p>8000050</p>	<p>DEENA-LV Main Board</p>
 <p>A black rectangular digital temperature controller. The front panel features a four-digit LED display showing "8888", a "SET" button, and two other buttons. The brand name "WATLOW" is printed above the display. On the right side, there are two terminals labeled "1" and "2" and a "RDY" indicator.</p>	<p>8000051</p>	<p>Temperature Controller</p>
 <p>A green PCB with several connectors and components. It has a multi-pin connector at the top and a row of four multi-pin connectors at the bottom. Text on the board includes "Thomas Cain" and "0148807".</p>	<p>8000052</p>	<p>ERICA-LV Main Board</p>

 <p>A green printed circuit board (PCB) populated with various electronic components. It features several integrated circuits, resistors, capacitors, and connectors. Text on the board includes "Thomas Cain", "0148006 rev.1.2", and "FWR SIDE".</p>	<p>8000053</p>	<p><i>ERICA Valve Board</i></p>
 <p>A white plastic pump module with a grey motor on the left side. It has two ports on top and a circular opening on the front. The brand name "WATSON" is visible on the front panel.</p>	<p>8000054</p>	<p><i>ERICA- LV Pump Module</i></p>
 <p>A black metal sample rack with a flat top surface featuring a grid of circular holes. It is supported by four thin legs.</p>	<p>8000059</p>	<p><i>Teflon-Coated Stainless Steel Sample Racks</i></p>
 <p>A kit containing two long, curved, light-colored peristaltic tubes and several white plastic fittings of different shapes.</p>	<p>8000060</p>	<p><i>Peristaltic Pump Tubing Kit</i></p>
 <p>A long, clear, flexible plastic tube with a small valve or fitting at one end, coiled into a loop.</p>	<p>8000062</p>	<p><i>Dispense Tube, Loop Valve, 1/16" O.D.</i></p>

Not Shown	8000064	Ultrasonic Sensor
	8000066	X-Axis Belt
	8000067	X-Axis Replacement
	8000070	Stepper Motor Connect Board
	8000073	Pump Tube Clamp
Not Shown	8000074	Peristaltic Pump Replacement Tubing Kit (barbed fittings only)
Not Shown	8000084	Plastic Rack Leg Screws
Not Shown	8000085 (Package of 20)	PTFE Coated Metal Rack Leg Screws
Not Shown	8000095	68mL Teflon Sample Tubes (vials)




	8010043	Plastic Rack Leg Replacement Kit
	8010044	Arm Assembly without Motor and Sensor
	8010045	Arm Belt Replacement Kit
<p style="text-align: center;"><i>Not Shown</i></p>	8010047	DEENA-m Sample Rack 15 positions

Table 1-2 DEENA Spare/Replacement Parts

Syringe Spares

Please refer to figures 1-3 and 1-4 for help in identifying Syringe parts.

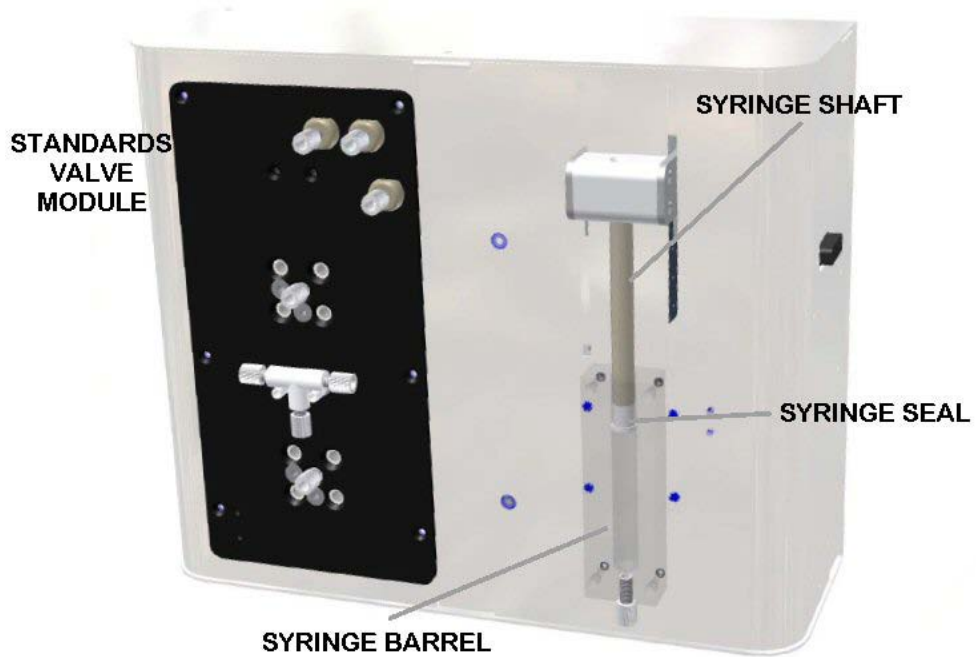


Figure 1-3 Syringe Spare/Replacement Parts I

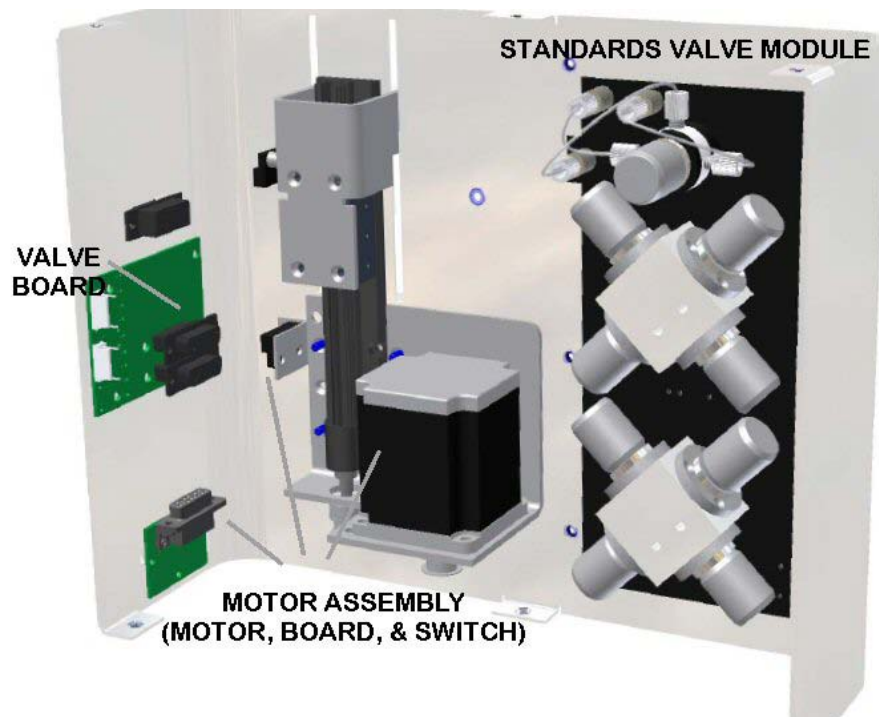


Figure 1-4 Syringe Spare/Replacement Parts II

Table 1-5 Syringe Spare/Replacement Parts

	Part Number	Part Name
<i>Not Shown</i>	8000025	<i>Standards Valve Module</i>
<i>Not Shown</i>	8000026	<i>Syringe Shaft</i>
<i>Not Shown</i>	8000027	<i>Syringe Barrel</i>
<i>Not Shown</i>	8000028	<i>Syringe Seal</i>
<i>Not Shown</i>	8000029	<i>Valve Board</i>
<i>Not Shown</i>	8000030	<i>Motor Assembly</i>
<i>Not Shown</i>	8000031	<i>Standards Valve Tubing Kit</i>
<i>Not Shown</i>	8000032	<i>Arm Tubing Kit – Syringe</i>

Table 1-5 Syringe Spare/Replacement Parts

Hood Spares

Please refer to figures 1-6 for help in identifying Hood parts.

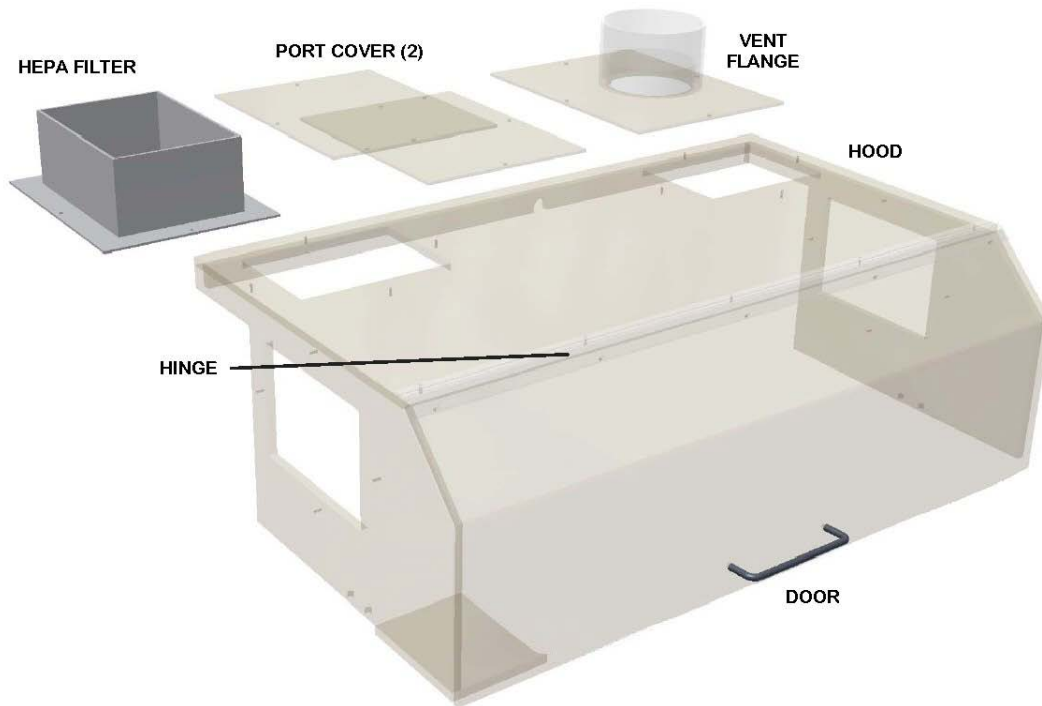


Figure 1-6 Hood Spare/Replacement Parts

	Part Number	Part Name
<i>Not Shown</i>	8000033	Vent Flange
<i>Not Shown</i>	8000034	Door
<i>Not Shown</i>	8000035	Hinge
<i>Not Shown</i>	8000036	Port Cover
	8000037	HEPA Filter

Table 1-6 Hood Spare/Replacement Parts

2) Maintenance

Routine Maintenance

Never apply lubricants to the instrument unless instructed by an authorized service representative.

Peristaltic Pump Calibration

It is recommended to calibrate the peristaltic pump at least once per month. The peristaltic pump may need to be calibrated more frequently depending on the sample volume. The more samples ran on the instrument the more frequently the peristaltic pump should be calibrated.

Typical rule of thumb: Calibrate the peristaltic pump every one thousand samples that are prepared with the instrument. If there are less than one thousand samples prepared in a one month time frame then the peristaltic pump should still be calibrated on a monthly basis.

Ultrasonic Sensor Calibration

The ultrasonic sensor (fill-to-volume) should not need to be recalibrated after the initial installation unless the customer wishes to increase the precision and accuracy for a final volume different than the current calibration.

The ultrasonic sensor is typically calibrated at a final volume of 50mL. Some methods require lower volumes than 50mL. If the ultrasonic sensor loses precision and accuracy at the lower volumes then it is recommended to perform the ultrasonic sensor calibration again. To increase precision and accuracy at a lower final volume then replace all the Vials with 50mL with the new volume of 'X'mL. (e.g. method 3050 calls for a final volume of 40mL. Change the 50mL vials to 40mL – this would be Vial positions 1, 5, 18, 43, 56, and 60.)

Syringe Calibration

It is recommended to perform the Syringe Calibration at the same time as the Pump Calibration. Though the Syringe does not need to be calibrated this often it will help remind the user to calibrate this item.

Peristaltic Pump tubing replacement

PN: 8000017 Description: Peristaltic Pump Replacement Tubing Kit

Warning: Always use appropriate laboratory protective garments (gloves, protective eyewear, etc.) when operating or performing any maintenance on DEENA.

1. Rinse DI water and then air through the pump, to ensure no dangerous reagents remain in the pump tubing.

2. Disconnect the reagent tubing luer fitting from the pump (figure 2-1).

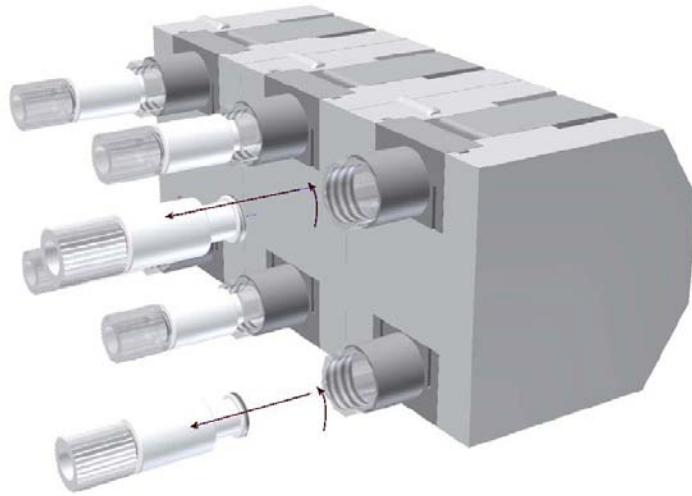


Figure 2-1

3. Pinch and pull the tube shoe, to remove it (figure 2-2).

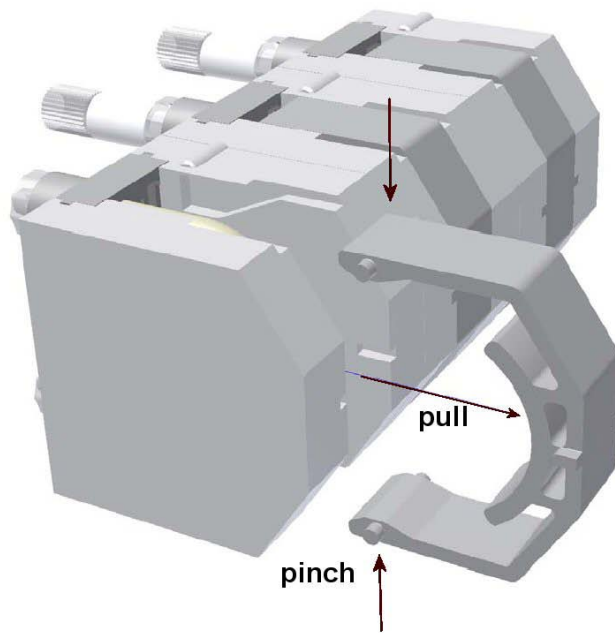


Figure 2-2

- Slide the tube end elements up and down respectively, to remove a tube (figure 2-3).

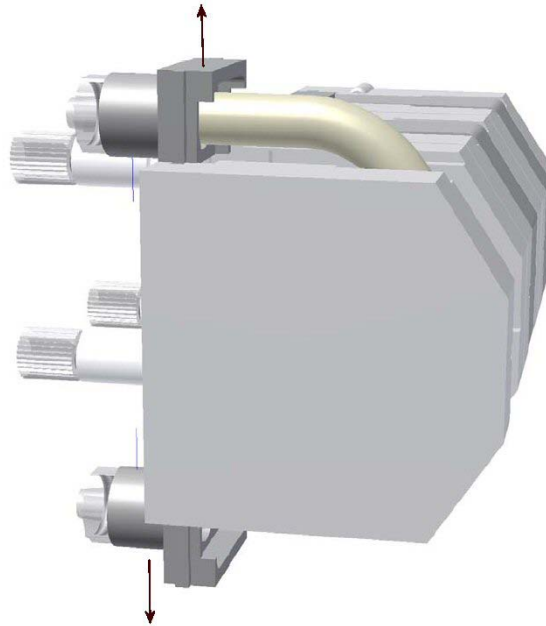


Figure 2-3

- Remove the barbed luer fitting to complete disassembly (figure 2-4).

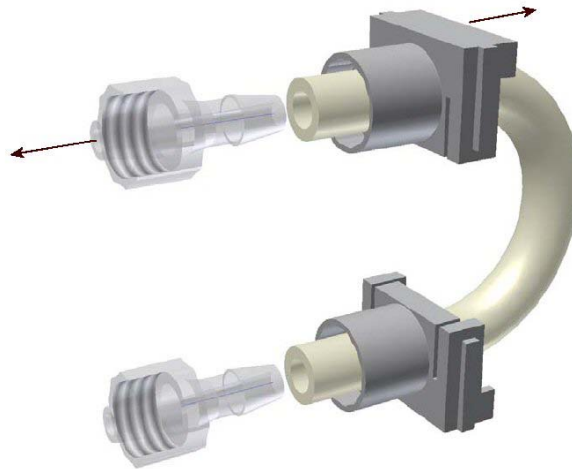


Figure 2-4

- Replace the tube element, and reassemble following the steps in reverse order. Complete for all three channels.

7. If **Chemsure® tubing is being used**; you will need to change the pump speed. In Manual Controls, change the pump speed to 20. In the Speed window, change the setting to 20, and press the Set button. (The wall thickness and hardness is different than the standard Marprene which ships with the instrument. The lower pump speed generates greater torque to overcome the increased stiffness of the tubing).

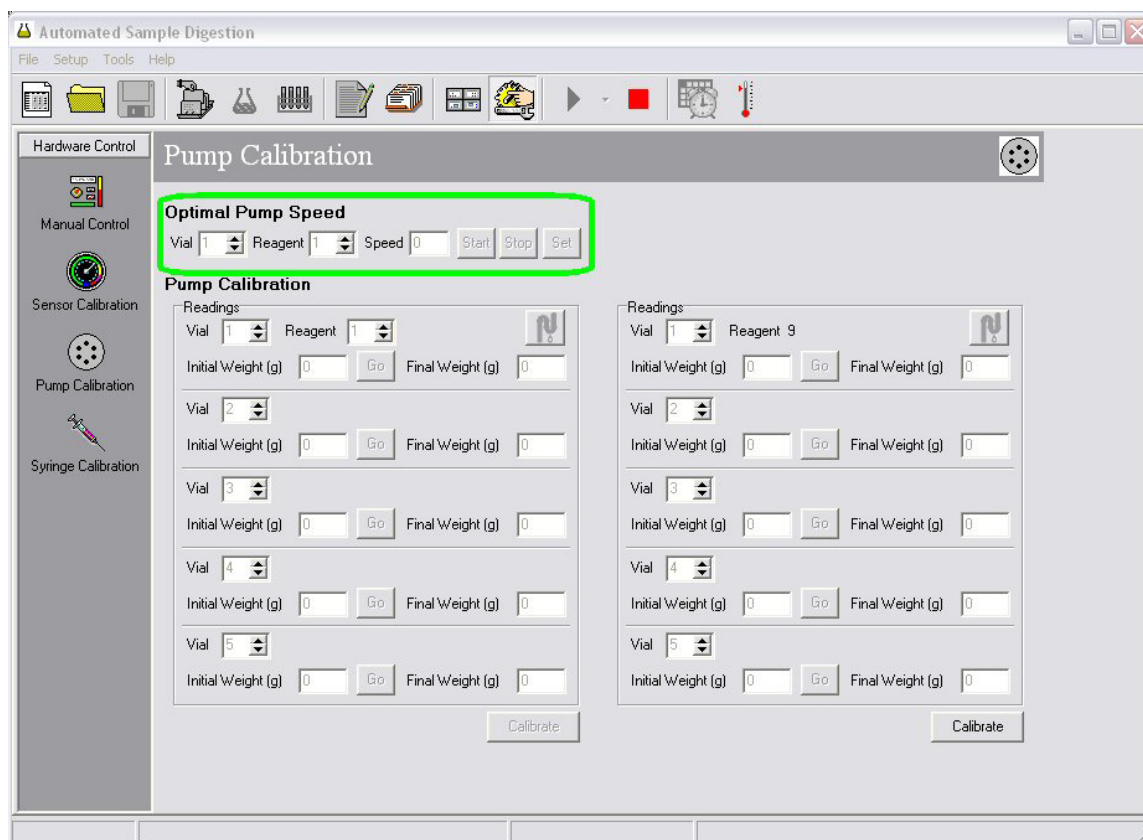


Figure 2-5

8. With no liquid connected (choose an unused reagent, or remove a sipper tube from the selected reagent), run the pump for a few minutes at this speed. This is to “break in” the tubing. It may “jitter” a little when it starts, but this will go away with continued use. As the tubing wears in, you may be able to increase the speed, if desired.

Back Flushing Reagent 9

1. To clean out the valve for reagent 9, which usually causes air bubbles in the line for reagent 9
2. You need to back flush the valve with Sodium Hydroxylamine Sulfate or whatever you use to eliminate the purple color from your permanganate. You may also use Hydroxylamine–HCL.

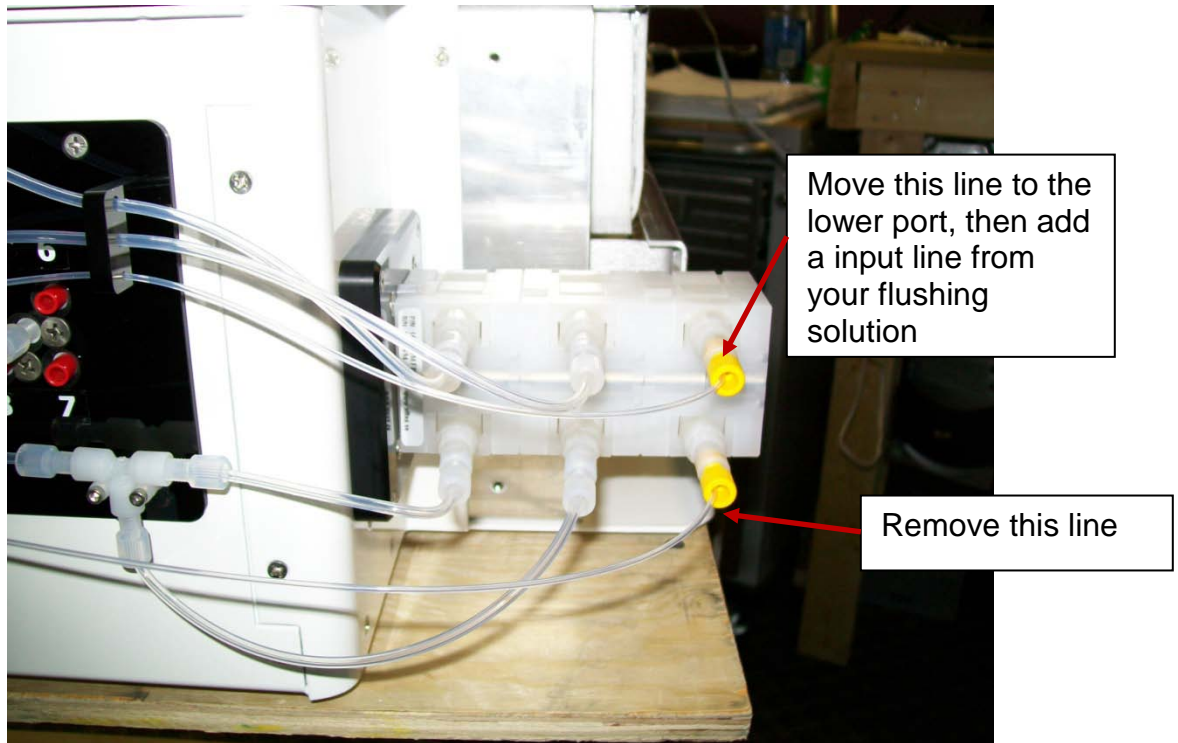


Figure 2-6

3. In order to back flush the valve you need to remove some tubes on the pump as shown below.
4. Now you will need to add a waste line to the input of the valve. As shown below.

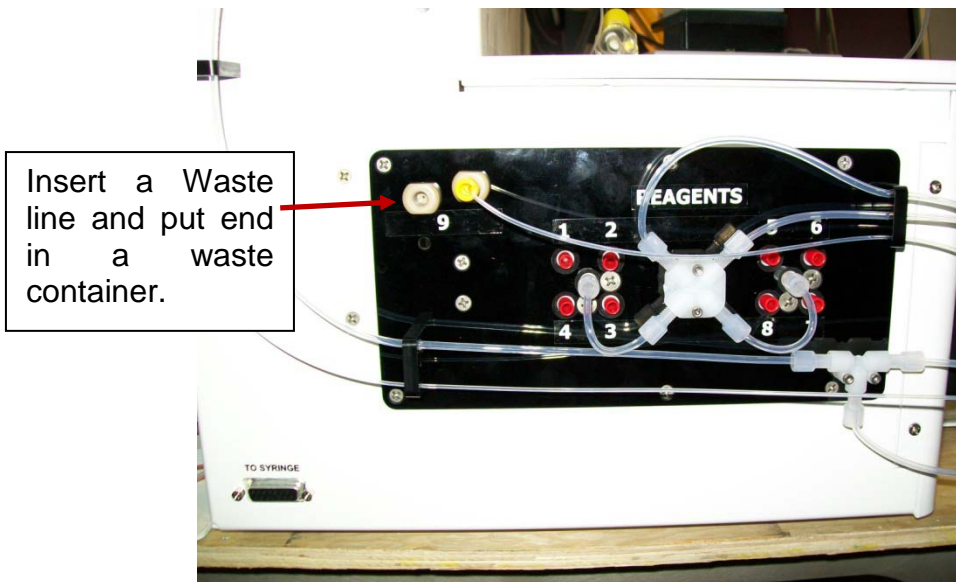


Figure 2-7

5. With everything attached, open the software and go to manual controls.

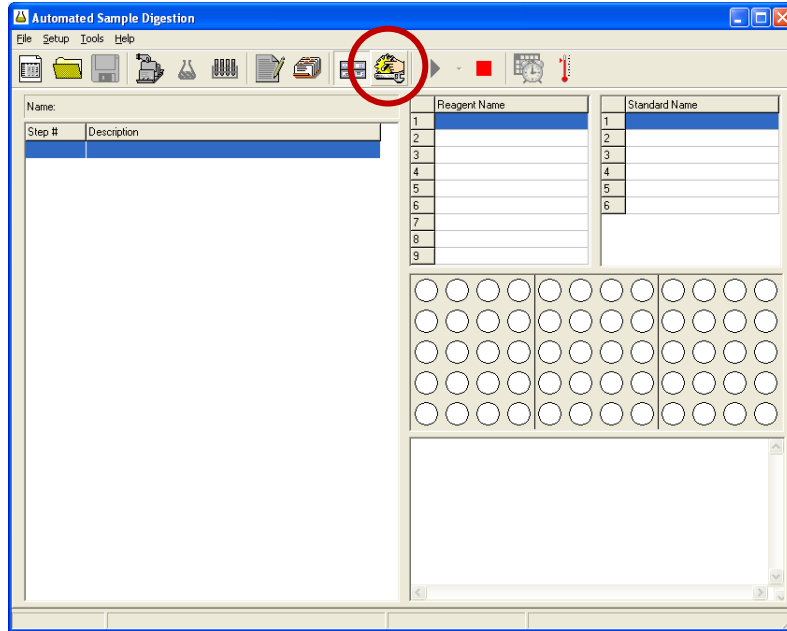


Figure 2-8

6. Now select reagent 9 and set the volume to 20-30mL then click the flush button

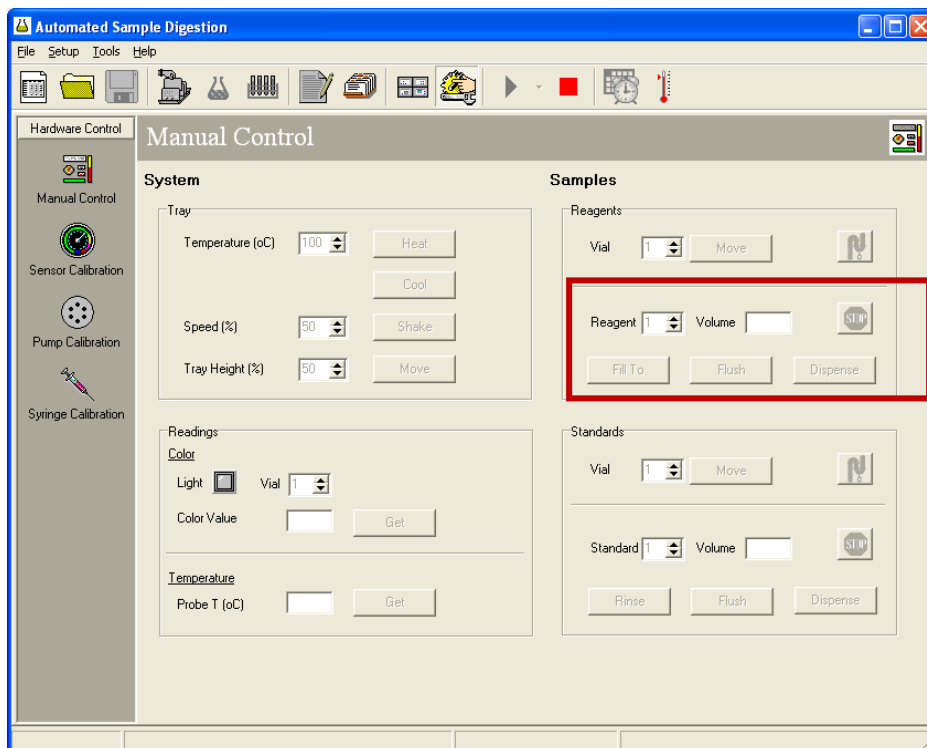


Figure 2-8

7. Once complete back flush with DI water for a few times. Then reconfigure the system and it was before and run some DI water thru Reagent 9 and inspect for air bubbles, 2 to 3 air bubbles may still be present and that is ok, just make sure there isn't a constant flow of air bubbles.
8. Run you calibration and return to using the system.
9. You may want to back flush the system on a regular basis, depending of the frequency of use.

Replacing the Belt of the Y-Axis

1. Remove Y axis for DEENA; also remove the motor so that the belt can be removed from the pulley.
2. Lay the arm on the edge of a table or on a arbor press, so that you can press the axle out.
3. Using an awl or a press with a pin, press the axle out far enough to remove the wheel and belt. (As Shown below in Figure 2-9.)

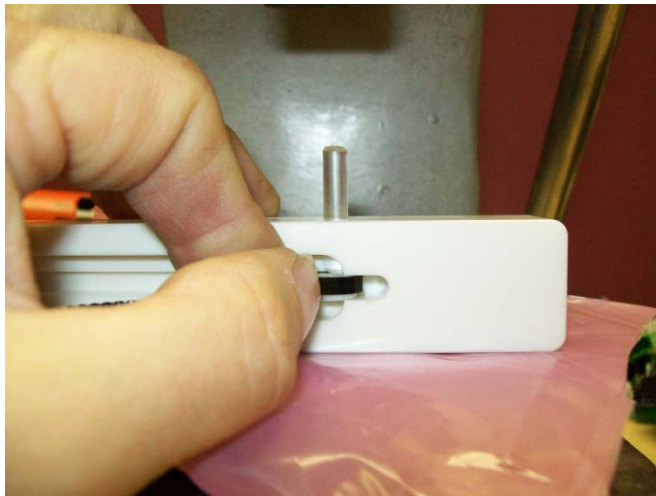


Figure 2-9

4. Using same wheel or a new wheel wrap belt around wheel and pitch. (As shown below in Figure 2-10.)



Figure 2-10

5. Insert in arm and gently press axle down, ensuring you don't smash the wheel. (As shown below in Figure 2-11.)



Figure 2-11

6. Reattach motor and adjust pullet so that belt is in the middle of the arm.

Routine Maintenance Schedule

<i>Maintenance Item</i>	<i>Schedule</i>
Peristaltic pump tubing replacement	Every six months as needed
HEPA filter replacement	Every six months as needed

Table 2-12 DEENA Maintenance Schedule

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Thomas Cain
Automation for Analytical Laboratories

